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A NEW MOUNTING MEDIUM.

By H. L. Smith, LL.D., Honorary F. R. M. S.

During the past few years considerable attention has been given to media of higher refractive power than Canada balsam, for the mounting of test and other microscopical objects, and particularly for diatoms, as the silicious frustules of these are so nearly of the same refractive index as most of the balsams and other mounting media used, as to be, in many cases, almost invisible, and from this circumstance the full power of the modern homogeneous objective cannot be displayed. The mono-bromide of naphthaline has been extensively used, and with some degree of success; and Mr. Stephenson, and also Mr. Möller have even produced very good preparations mounted in phosphorus. The mono-bromide is objectionable, as it is a fluid which, for some reason, often decomposes, at least such is my experience and that of others, and, like all fluid mounts, liable to leakage, and requiring careful manipulation; while phosphorus is too dangerous, and, indeed, is entirely outside the use of any but the most skillful manipulators, and even as prepared by by these, if we may judge from Möller's preparations, will spoil in time.

I have spent considerable time in experimenting, and, though I am not yet entirely satisfied with my success, I have discovered two mounting media, one colorless, or very nearly so, the other a deep lemon yellow, and having refractive indices respectively, of about 2 and 2.4—the latter, though objectionable on account of the color, I think I may pronounce, as I now use it, entirely permanent. It has been only after considerable experimenting and long waiting that I am able to say this. The colorless medium is by far the more important one, though the refractive index is not quite so high, varying from about 1.8 to 2. This medium, which displays the markings on the Diatomaceæ much better than the dry mounts, I propose now to make known. It *can* be made so as to give *permanent mounts*, though I am not able to state just now the conditions of complete success, which appear to depend upon very slight differences either in the preparation of the medium or in the mounting; but I trust that some one, who may have more leisure and skill, will discover the secret.

I have many mounts that were made about eight months ago, which are apparently as good as when first made, while others, made later, are beginning to show evidence of change in depositing crystals. Any one can prepare the new medium in small quantities, say in a homœopathic vial, in a few moments, and although the ingredients are poisonous, there is not the slightest danger in their use, if ordinary care is taken. The medium, when made according to the directions to be given, is a viscid (more or less) fluid, and mounts are made precisely as with balsam, and like that material it becomes hard after heating and cooling. I commenced my experiments with the terchloride of antimony, and in this substance I dissolved arsenious acid, adding the latter little by little, and dissolving by aid of high heat, under a ventilating shaft, until a drop of the hot liquid, taken out and put on a cold glass, became a glassy solid on cooling. It seemed as though mounts in this, if protected from moisture, would be permanent. (I may here say that all preparations of chlorides and bromides of antimony and arsenic are more or less deliquescent and decomposable by moisture.) Time, however, has shown that it is difficult to use the solid glassy mass, prepared as described, whether in the solid state, or softened by chloride of arsenic, in which it is soluble, to make permanent mounts. Very beautiful preparations, lasting weeks or even months, can be made, but so far as my experience goes, all will, sooner or later, undergo changes; crystalization, or even opacity, if moisture gets at the mount, will ensue.

Discarding then the chlorides of antimony, I next tried the arsenite of antimony as used in medicine. This is a white powder and generally sold, as labeled from the German laboratories, as *stibium* *arsenicos;* this substance is largely soluble in the liquid *chloride of arsenic;* dissolved in this until it is a somewhat dark colored, honey-like viscid fluid, which is used precisely like balsam, it makes almost colorless mounts of great beauty, and, as I have said, under certain conditions (not yet fully clear to me), promising permanence; and in any case it is superior to any other compounds of high refractive power with which I am at present acquainted, excepting alone the yellow medium, which has too high an index for any but test diatoms.

I have always prepared the compound in small quantities, in an open room, and in a homœopathic vial, and have never experienced the least bad effect from the poisonous character of the ingredients as very high heat is not required; still, one must be cautious. In making it I have proceeded thus: the vial is about one-third filled with the liquid chloride of arsenic (this is a fuming, somewhat volatile fluid); into this some of the arsenite of antimony (*stibium arsenicos*) is put, say one-third the bulk of the liquid, and the mixture warmed over a spirit-lamp flame until all is dissolved, when another, perhaps additional quantity, is again added, heated and dissolved, and then, little by little, successive portions of the arsenite must be added and dissolved, until a drop taken out and put on to a cold glass plate, is too viscid to run. If the ingredients are clean, no filtering will be necessary. It may, however, be filtered, if needed, but now must be left considerably more fluid, and after filtering the solution may be made more viscid, like thick balsam, by boiling under a flue, or where the fumes will not be injurious, or liable (as they are quite corrosive) to affect any microscopical apparatus near.

A rubber cork answers very well to close the vial, and the material thus made will keep very well. A slip of glass or of mica answers very well to take out a drop for use, and this glass slip can easily be cleaned by removing any excess with moistened tissue-paper, and then heating well in flame of spirit-lamp.

If the solution in the vial is overheated, it browns somewhat, and in any case will be about the color of dark sherry wine, but the mounts will be quite colorless, or very nearly so, and much better for photographic purposes than even the best dry mounts.

In making a mount, only as much of the mixture must be used as is necessary—a little experience will enable one to judge upon this point,—and after the boiling, which should be prolonged until the large easily formed bubbles of the excess of chloride disappear, the portion outside will be found to be hard and requiring considerable force to be removed; this removal must be effected by a sharp edge, and with care not to disturb the cover. Of course the material under the cover will be softer, and if, after cooling, it appear soft at the edge, further heating will be required. The bubbles of air and steam are removed much more readily than when using balsam. After cleaning off the excess, as far as can be done safely with a knife or sharp edge, the cover and remaining portions of the unscraped material may be washed over by a roll of tissue-paper well moistened with hydrochloric acid; this will remove the bloom, the vapor of antimony and arsenic, on the cover and slide, and also the excess of the medium not removed by the sharp edge, and will leave all ready for the wax ring. No water should be used, or alcohol, as these liquids decompose the medium, causing it to become an opaque white. The slide and cover, prepared as described, I have found in some cases to be well protected by simply a coating of the zinc white, but the most satisfactory mounts are made by using wax. For this purpose I punch out a ring from sheet wax (I prefer the vermilion colored sheets as used for artificial flowers), by means of brass or other tubes, leaving the ring sufficiently broad to cover well the edge of the cover and a portion of the slide; this ring is put in place, and the slide gently warmed, until the wax barely melts. If the slide has been heated previously, sufficiently to harden the medium, the melted wax will not enter at all under the cover; the slide is now quickly cooled, and at any convenient time a finishing coat of shellac may be given, making a very neat mount. I have slides prepared last March, which are yet as good as when first made. Others, however, not so old, show some crystal deposits. Evidently the permanence depends upon some slight difference in the preparation of the medium or the mounts, and though I am not able to state now the conditions of success, I do not doubt but that some one will soon perfect the medium, and enable us to use confidently a material quite as easy to handle as Canada balsam, but giving mounts of the Diatomaceæ which far surpass in clearness and beauty any dry mounts.

The yellow medium of 2.4 refractive index, is too high for any but test diatoms. It is a very dark colored, thick fluid, which becomes hard on heating. I am not quite ready to publish the formula for this.

NOTE.—Since the above was written, I find that both mediums improve by age, and, in the case of the compound of arsenic and antimony, the crystals which may tend to form from an excess of either of these ingredients will deposit, and a clear solution can be poured off which appears to make permanent mounts.